NTSB National Transportation Safety Board

Aviation Lesson Learned:

Better Collaboration Can Help Improve Safety *and* Productivity

Presentation to: DOE Nuclear Executive Leadership Training

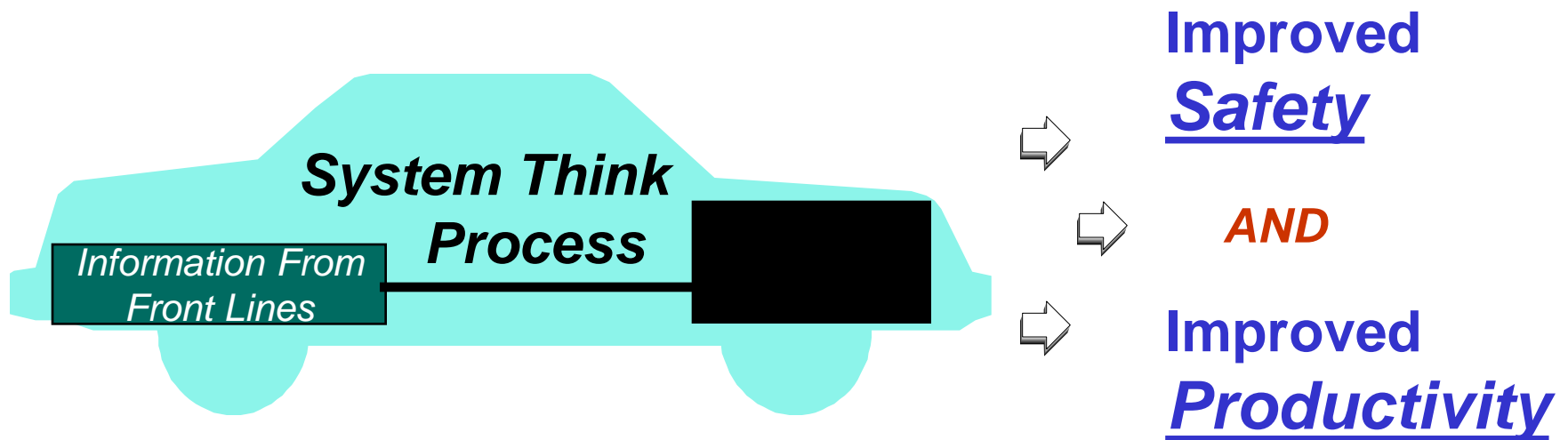Name: Christopher A. Hart

Date: August 12, 2013

The Contrast

- Conventional Wisdom:

Improvements that reduce risk usually *also reduce productivity*

- Lesson Learned from Proactive Aviation Safety Programs:

Risk can be reduced in a way that also results in *immediate productivity improvements*

Process Plus Fuel Creates a Win-Win

System Think Process

Information From Front Lines

Improved *Safety*

⇨

⇨ *AND*

⇨

Improved *Productivity*

Outline

- **The Context**

- **Importance of "System Think"**

- **Importance of Better Information**

- **Safety Benefits**

- **Productivity Benefits**

- **Aviation Successes and Failures**

- **Roles of Leadership and Regulator**

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The Context: Increasing Complexity

- **More System *Interdependencies***
  - Large, complex, interactive system
  - Often tightly coupled
  - Hi-tech components
  - Continuous innovation
  - Ongoing evolution

- **Safety Issues Are More Likely to Involve *Interactions Between Parts of the System***

AIRLINES

PILOTS

CONTROLLERS

The System

MECHANICS

MANUFACTURERS

INVESTIGATOR

REGULATOR
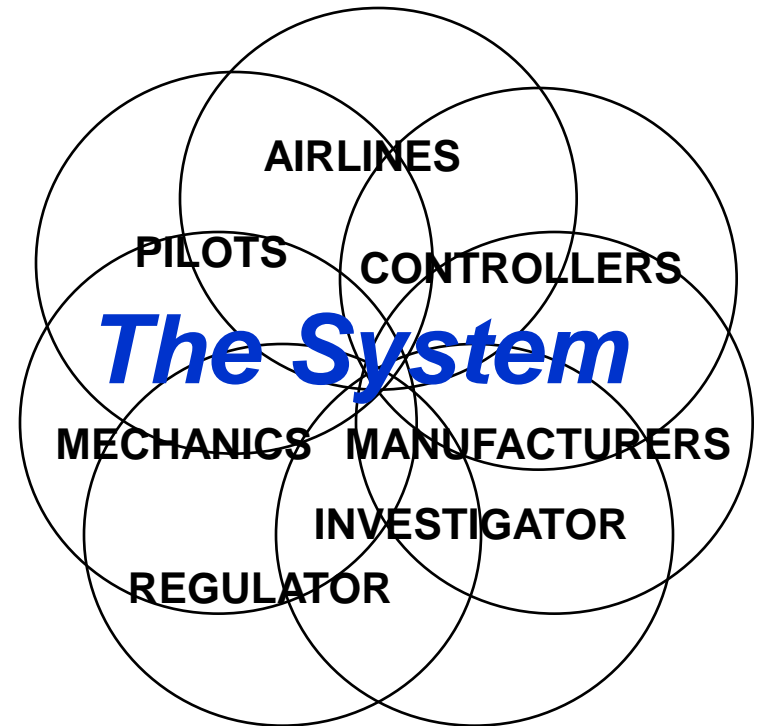
Effects of Increasing Complexity:

More "Human Error" Because

- **System More Likely to be Error Prone**

- **Operators More Likely to Encounter Unanticipated Situations**

- **Operators More Likely to Encounter Situations in Which "By the Book" May Not Be Optimal ("workarounds")**

<u>The Result:</u>

Front-Line Staff Who Are
- Highly Trained
- Competent
- Experienced,
-Trying to Do the Right Thing, and
- Proud of Doing It Well

. . . Yet They Still Commit

Inadvertent
Human Errors

When Things Go Wrong

How It Is Now . . .

You are highly trained

and

If you did as trained, you would not make mistakes

so

You weren't careful enough

so

You should be PUNISHED!

How It Should Be . . .

You are human

and

Humans make mistakes

so

Let's *also* explore why the system allowed, or failed to accommodate, your mistake

and

Let's IMPROVE THE SYSTEM!

Fix the Person or the System?

Is the Person Clumsy?

Or Is the Problem . . .

The Step???

Enhance Understanding of Person/System Interactions By:

- Collecting,

- Analyzing, and

- Sharing

Information

Objectives:

Make the System

*(a) Less
Error Prone*

and

*(b) More
Error Tolerant*

The Health Care Industry

To Err Is Human:

Building a Safer Health System

"The focus must shift from blaming individuals for past errors to a focus on preventing future errors by designing safety into the system."

Institute of Medicine, Committee on Quality of Health Care in America, 1999

Major Source of Information: Hands-On "Front-Line" Employees

"We Knew About That Problem"

(and we knew it might hurt
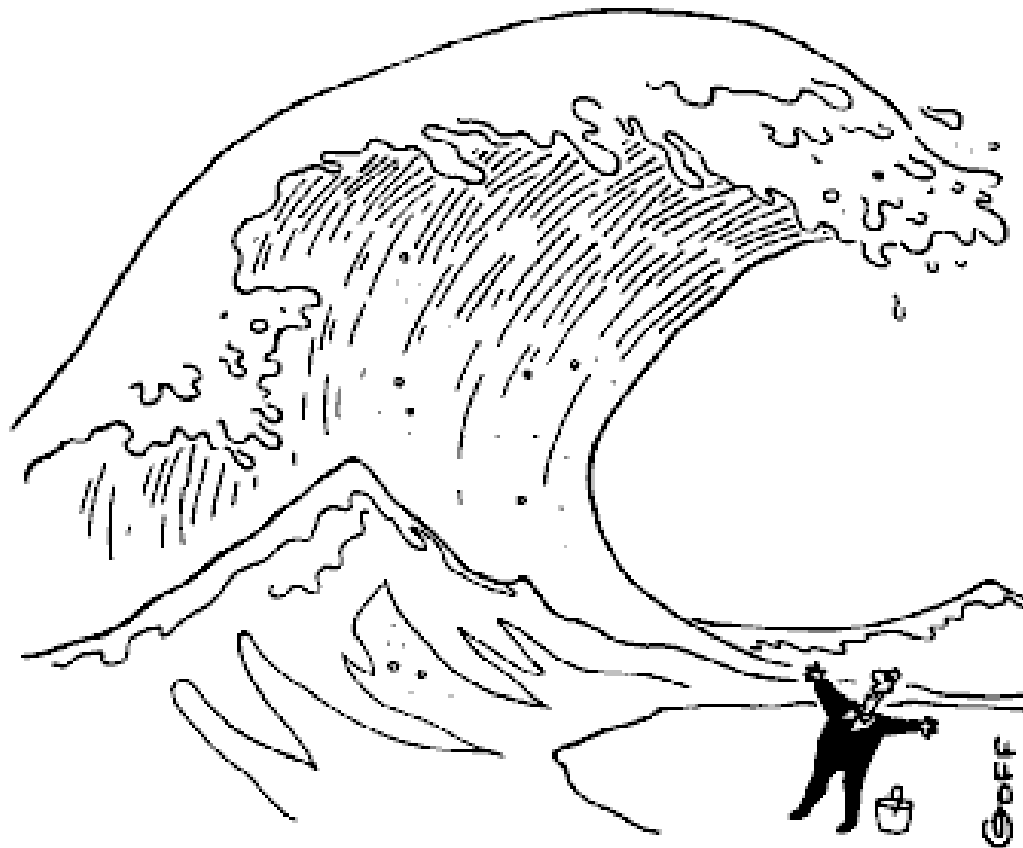
someone sooner or later)

Next Challenge

Improved Analytical Tools

Legal/Cultural Issues

As we begin to get over the first hurdle, we must start working on the next one . . .

Information Overload

© 1996 Ted Goff

"EUREKA! MORE INFORMATION!"

From Data to Information

***Tools and processes to convert
large quantities of data into useful information***

Data Sources

Info from
front
line
staff
and
other
sources

DATA

Analysts

USEFUL

INFORMATION

Tools

Processes

Smart Decisions

- **Identify issues**
- ***PRIORITIZE!!!***
- **Develop solutions**
- **Evaluate interventions**

Aviation Success Story

65% Decrease in Fatal Accident Rate, 1997 - 2007

largely because of
System Think

fueled by
Proactive Safety Information Programs

P.S. Aviation was already considered *VERY SAFE* in 1997!!

Aviation "System Think" Success

Engage _All_ Participants In Identifying Problems and Developing and Evaluating Remedies

- **Airlines**

- **Manufacturers**
  - _With the systemwide effort_
  - _With their own end users_

- **Air Traffic Organizations**

- **Labor**
  - _Pilots_
  - _Mechanics_
  - _Air traffic controllers_

- **Regulator(s) [Query: Investigator(s)?]**
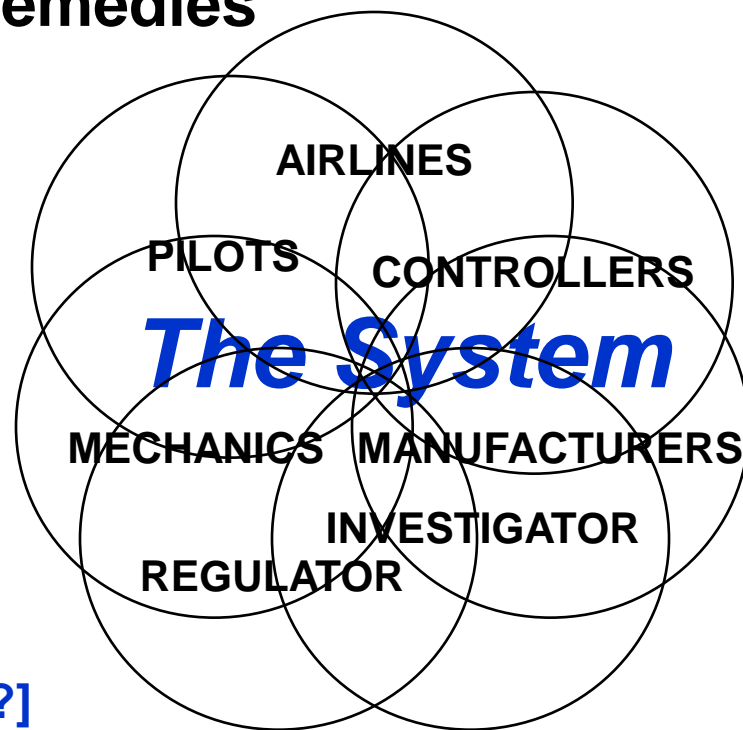
Major Paradigm Shift

– **Old: The regulator identifies a problem, develops solutions**
  - **Industry skeptical of regulator's understanding of the problem**
  - **Industry fights regulator's solution and/or implements it begrudgingly**

– **New: Collaborative "System Think"**
  - **Industry involved in indentifying problem**
  - **Industry "buy-in" re solution because everyone had input, everyone's interests considered**
  - **Prompt and willing implementation**
  - **Solution probably more effective and efficient**
  - **Unintended consequences much less likely**

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Challenges of Collaboration

- Requires all to be willing, in their enlightened self-interest, to leave their "comfort zone" and think of the System

- Not a democracy
  - Regulator must regulate

- Regulator probably not welcome

- Labor/Management issues between some participants

- Participants are potential co-defendants
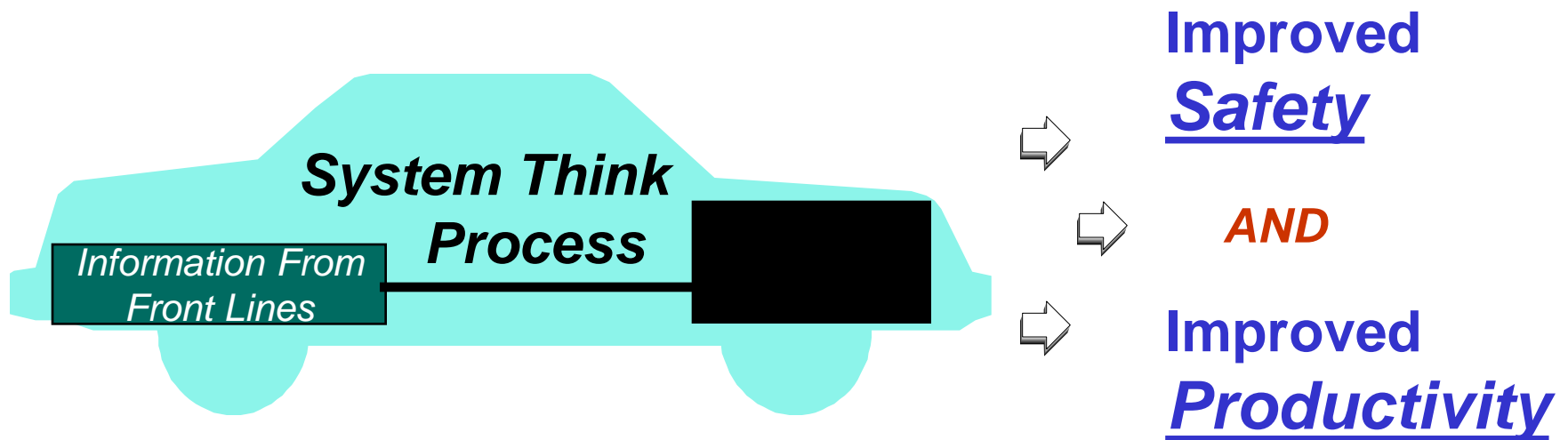
Applicability of Collaborative Approach:

- **Entire Industry**

- **Company (Some or All)**

- **Type of Activity**

- **Facility**

- **Team**

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Manufacturer "System Think" Success

Aircraft Manufacturers are Increasingly Seeking Input, Throughout the Design Process, From

- *Pilots*   (*User* Friendly)

- *Mechanics*   (*Maintenance* Friendly)

- *Air Traffic Services*   (*System* Friendly)

Process Plus Fuel Can Produce An Amazing Win-Win

System Think Process

Information From Front Lines

⇨ **Improved *Safety***

⇨ *AND*

⇨ **Improved *Productivity***

P.S. Collaboration also significantly reduces the likelihood of unintended consequences!

Not Only Improved Safety, But Improved Productivity, Too

- **Ground Proximity Warning System**
  - *S: Reduced warning system complacency*
  - *P: Reduced unnecessary missed approaches, saved workload, time, and fuel*

- **Flap Overspeed**
  - *S: No more potentially compromised airplanes*
  - *P: Significantly reduced need to take airplanes off line for VERY EXPENSIVE (!!) disassembly, inspection, repair, and reassembly*

But Then . . .

Why Are We

So Jaded in The Belief That

Improving Safety

Will Probably

Hurt The Bottom Line??

Costly Result$
Of Safety Improvements Poorly Done

Safety *Poorly* Done

1. **Punish/re-train operator**

- Poor workforce morale

- Poor labor-management relations

- Labor reluctant to tell management what's wrong

- Retraining/learning curve of new employee if "perpetrator" moved/fired

- Adverse impacts of equipment design ignored, problem may recur because manufacturers are not involved in improvement process

- Adverse impacts of procedures ignored, problem may recur because procedure originators (management and/or regulator) are not involved in improvement process

Safety *Well* Done

Look beyond operator, also consider system issues

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Costly Result$
Of Safety Poorly Done (con't)

Safety _Poorly_ Done

Safety _Well_ Done

2. Management decides remedies unilaterally

Apply "System Think," _with workers_, to identify and solve problems

- Problem may not be fixed
- Remedy may not be most effective, may generate other problems
- Remedy may not be most cost effective, may reduce productivity
- Reluctance to develop/implement remedies due to past remedy failures
- Remedies less likely to address multiple problems

3. Remedies based upon instinct, gut feeling

Remedies based upon evidence (including info from front-line workers)

- Same costly results as No. 2, above

Costly Result$
Of Safety Poorly Done (con't)

Safety _Poorly_ Done

Safety _Well_ Done

**4. Implementation is
   last step**

**Evaluation after
implementation**

- *No measure of how well remedy worked (until next mishap)*

- *No measure of unintended consequences (until something
  else goes wrong)*

Conclusion: Is Safety Good Business*?*

- *Safety implemented poorly can be* *very costly (and ineffective)*

- *Safety implemented well, in addition to improving safety more
  effectively, can also* *create benefits greater than the costs*

The Role of Leadership

- Demonstrate Safety Commitment . . .
But Acknowledge That Mistakes Will Happen
- Include "Us" (*e.g.*, System) Issues,

Not Just "You" (*e.g.*, Training) Issues
- **Make Safety a Middle Management Metric**
- Engage Labor Early
- Include the *System* --
Manufacturers, Operators, Regulator(s), and Others

- Encourage and Facilitate Reporting
- Provide *Feedback*
- Provide Adequate *Resources*
- *Follow Through* With Action

How The Regulator Can Help

- Emphasize the importance of System issues *in addition to (not instead of)* worker issues

- Encourage and participate in industry-wide "System Think"

- Facilitate collection and analysis of information
  - Clarify and announce *policies for protecting information and those who provide it*
  - Encourage other industry participants to do the same

- Recognize that *compliance* is very important, but the *mission is reducing systemic risk*

Thank You!!!

Questions?